

***I Claim:***

1       1. High-resolution sheet metal scanner using machine vision for checking the accuracy of  
2       openings drilled or punched into a mechanical part, comprising:

3                 a lower assembly which includes a housing which is environmentally sealed sufficiently  
4       to exclude dust and contaminates; a planar scanning carriage assembly within said housing and  
5       capable of producing controlled movement of a carriage member in two orthogonal directions in  
6       a horizontal plane; a flat transparent support plate disposed on an upper side of said housing on  
7       which said part is to be supported for viewing; and a camera assembly mounted on said carriage  
8       member and oriented upwards including an imager for producing at least one line of pixels and  
9       focussing means for focussing said imager upon an upper surface of said support plate;

10                 a planar illuminator mounted above said lower assembly and providing a substantially  
11       uniform light over an area coextensive with said support plate; and

12                 control means coupled with said carriage assembly and with said camera assembly for  
13       guiding said camera assembly in a controlled scanning pattern within said lower assembly  
14       housing and processing image data of said part based on lines of pixels produced by said camera  
15       assembly imager.

1       2. The high-resolution sheet metal scanner of Claim 1 wherein said camera assembly includes a  
2       polarizing filter.

1       3. The high-resolution sheet metal scanner of Claim 1 wherein said illuminator includes a bank  
2       of parallel fluorescent tubes.

1       4. The high-resolution sheet metal scanner of Claim 1 wherein said scanning carriage assembly  
2       includes a first lead screw, a first stepper motor for controllably rotating said first lead screw, a  
3       second lead screw, a second stepper motor for controllably rotating the second lead screw, first  
4       and second stage rails arranged orthogonally and means for permitting said carriage to travel

5 along said first and second stage rails in accordance with rotation of said first and second lead  
6 screws.

1 5. The high-resolution sheet metal scanner of Claim 4 including first and second high-resolution  
2 tape encoders within said housing for determining X and Y location of said carriage.

1 6. The high-resolution sheet metal scanner of Claim 1 wherein said imager includes a linear  
2 imager producing one line of pixels at a time.

1 7. The high-resolution sheet metal scanner of Claim 1 including position adjusting means for fine  
2 adjustment of vertical position of said support plate.

8. The high-resolution sheet metal scanner of Claim 1 wherein said control means includes  
means to adjust the dimensions of scan to the size of the part.

9. The high-resolution sheet metal scanner of Claim 1 wherein said lower assembly further  
includes motion damping support means to minimize effects of floor vibration on action of the  
scanning carriage assembly.

10. The high-resolution sheet metal scanner of Claim 9, wherein said motion damping means  
includes means for tuning to damp out specific frequencies.

11. The high-resolution sheet metal scanner of Claim 1, wherein said scanning carriage assembly  
includes respective first and second timing belts and pulleys acting in first and second orthogonal  
directions, first and second stepper motors operatively coupled to the first and second timing  
belts, respectively, first and second-stage rails arranged orthogonally and means for permitting  
said carriage to travel along said first and second stage rails in accordance with rotation of said  
first and second timing belts.